

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/11987

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : F16J 15/02

US CL : 277/309, 549, 551, 562, 571, 572, 573, 576, 577

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 277/309, 549, 551, 562, 571, 572, 573, 576, 577

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,448,426 A (Jackowski et al) 15 May 1984 (15.05.1984), See entire document.	1-6
X	US 4,428,586 A (Romero) 31 January 1984 (31.01.1984), See entire document	1-6
X	US 3,135,518 A (Carson et al) 02 June 1964 (02.06.1964), See entire document	1-5
X	US 4,327,922 A (Walther) 04 May 1982 (04.05.1982), See entire document	1-6
A	US 4,856,794 A (Boyers et al) 15 August 1989 (15.08.1989), Entire document.	1-6
A	US 5,096,207 A (Seeh et al) 17 March 1992 (17.03.1992), Entire document.	1-6
A	US 5,201,529 A (Heinzen) 13 April 1993 (13.04.1993), Entire document.	1-6
A	US 5,269,536 A (Matsushima et al) 14 December 1993 (14.12.1993), Entire document.	1-6
A	US 6,083,109 A (Gerulski) 04 July 2000 (04.07.2000), Entire document.	1-6

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

05 May 2005 (05.05.2005)

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